Deterioration Following Alcohol-Use Disorder Treatment in Project MATCH*

MARK ILGEN, PH.D.,† AND RUDOLF MOOS, PH.D.

Center for Health Care Evaluation, Department of Veterans Affairs, Palo Alto Health Care System and Stanford University School of Medicine, 795 Willow Road (MPD 152), Menlo Park, CA 94025

ABSTRACT. Objective: This study examines the prevalence and predictors of deterioration during the three months following treatment in Project MATCH (Matching Alcoholism Treatments to Client Heterogeneity), a multisite clinical trial of three different treatments for alcohol-use disorders. **Method:** The outpatient and aftercare samples of Project MATCH were examined to identify the prevalence of deterioration, as reflected by a decline in percent days abstinent between the 3 months prior to baseline and the 3 months immediately following treatment. Analyses of predictors of deterioration were based on baseline sociodemographic and psychological factors, including substance-related and psychiatric symptoms and treatment-related factors, including treatment type, treatment duration and therapeutic alliance. **Results:** Approximately 10% (91/927) of patients in the outpatient sample and 7% (50/738) of patients in the aftercare sample deteriorated in the 3 months following treatment. Primary predictors of deterioration in the outpatient sample were lower baseline severity of alcohol dependence, higher baseline depression, fewer sessions of treatment and lower ratings of therapeutic alliance. The only factor associated with deterioration in the aftercare sample was fewer sessions of treatment. **Conclusions:** Despite the general positive response of patients to alcohol-use disorder treatment, researchers and treatment providers need to be aware of the potential for deterioration in a sizable minority of patients. Potential methods for identifying patients at risk for deterioration early in treatment are discussed. (*J. Stud. Alcohol* **66:** 517-525, 2005)

PUBLISHED REPORTS OF OUTCOMES following treatment for substance-use disorders typically focus on improvements in substance use during treatment and/or the follow-up period (e.g., Donovan, 1999; Elkin et al., 1989; Project MATCH Research Group, 1997). However, a growing body of literature indicates that about 10% of patients treated for substance-use disorders experience some level of deterioration or symptom exacerbation, either during treatment or soon thereafter (Moos et al., 2001, 2002; Shaw et al., 1990, 1997). Moos (2005) indicates that attending to deterioration is important above and beyond a traditional focus on treatment outcomes because of the need for treatment providers to be aware of and try to prevent symptom exacerbation concomitant with treatment. Yet, little is known about patients who are at greatest risk for deterioration or aspects of substance-use disorder treatment most strongly associated with deterioration.

Masserman and Carmichael (1938) first identified the risk for deterioration in psychiatric care more than 65 years ago. More recently, in a review of more than 40 psychotherapy outcome studies describing patient deterioration, Mohr (1995) reported rates of deterioration ranging from roughly 3% to 80%. These studies varied widely in patient composition, setting, and focus and type of treatment. However, none of the studies reviewed specifically focused on the treatment of substance-use disorders.

To the best of our knowledge, only five studies have explicitly focused on deterioration in patients treated for substance-use disorders (Moos et al., 2001, 2002; Ouimette et al., 1997; Shaw et al., 1990, 1997). Within these studies, rates of deterioration ranged from 10% to 30%, probably due to variations in sample characteristics, type of treatment provided and the definition of deterioration.

Moos (2005), recently presented a model intended to guide future research on the prevalence and determinants of deterioration during and shortly after substance-use disorder treatment. This model highlights the importance of identifying patient attributes (such as severity of substance use, psychiatric symptoms and deficits in interpersonal skills) and treatment factors (such as lack of bonding and treatment alliance, confrontation and lack of monitoring) that may be associated with a heightened risk for deterioration.

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†Correspondence may be sent to Mark Ilgen at the above address, or via email at: Mark.Ilgen@med.va.gov.

Past research in this area has primarily examined patient characteristics related to deterioration. In general, patients who deteriorated during substance-use treatment or during a follow-up period tended to be younger, black, unmarried and residentially unstable. Deterioration was also linked to several factors associated with baseline patterns of substance use, including more severe substance use, current cocaine use, and a history of prior arrests and prior treatment. In addition, patients were more likely to deteriorate if they had more severe psychiatric symptoms or a history of inpatient psychiatric treatment (Moos, 2005). After accounting for many of these patient factors, shorter duration of treatment and fewer outpatient mental health visits predicted a higher likelihood of deterioration (Moos et al., 2001). Further research is needed to identify other treatment factors related to deterioration.

One aspect of treatment that has been reliably tied to *positive* treatment outcomes in patients with substance-use disorders is the therapeutic alliance (for a review, see Lebow et al., in press). For example, in Project MATCH (Matching Alcoholism Treatments to Client Heterogeneity), patients' and therapists' ratings of the quality of the therapeutic relationship predicted positive response to outpatient treatment (Connors et al., 1997). As far as we know, no one has yet investigated the connection between poor therapeutic alliance and deterioration.

Project MATCH provides a unique opportunity to examine the relationship between deterioration and some of the patient and treatment-related factors described in Moos' (2005) framework. In this regard, (1) Project MATCH was a large, multisite, randomized clinical trial of alcohol-use disorder treatment (Project MATCH Research Group, 1997); (2) treatment providers were well trained and the quality of treatment was monitored throughout the trial; (3) the duration of treatment was designed to be equivalent for all patients; and (4) qualitative information was available about the treatment process (e.g., therapeutic alliance). Thus, some of the variations in patient factors (psychopathology and drug use) and treatment factors (wide variations in quality of care) reported in past research on deterioration are not present in this sample. As a result, Project MATCH is likely to provide conservative estimates of rates of deterioration and offers an opportunity to examine treatment factors under optimal conditions.

We first determined the rate of patient deterioration over the 3 months immediately following treatment within Project MATCH. Then, we examined the relationship between deterioration and (1) baseline sociodemographic and psychological factors, including information about substance-related and psychiatric symptoms and (2) treatment-related factors, including treatment type, treatment duration and therapeutic alliance. Finally, we tested whether treatment factors were predictive of deterioration above and beyond the effect of patient factors.

Method

Project MATCH was designed to investigate the interactions of patient characteristics and treatment type in predicting outcomes following alcohol treatment. Patients were randomly assigned to one of three treatments: Twelve Step Facilitation (TSF; Nowinski et al., 1992), Cognitive-Behavioral Treatment (CBT; Kadden et al., 1992) or Motivational Enhancement Therapy (MET; Miller et al., 1992). Project MATCH was composed of two independent samples that were labeled *outpatient* and *aftercare*. Patients in the outpatient sample had not recently completed any inpatient treatment. The aftercare sample comprised patients who had received 7 days or more of inpatient or intensive day treatment immediately prior to assignment to outpatient aftercare treatment. Patients were assessed at multiple time points before, during and following treatment (Babor and Del Boca, 2003).

Participants

To be eligible for Project MATCH, patients were required to be over 18 years of age and (1) meet the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV; American Psychiatric Association, 1994) criteria for alcohol abuse or dependence; (2) report alcohol as the primary substance of use; (3) report current alcohol use within 3 months of treatment entry; (4) not meet criteria for dependence on sedative/hypnotic drugs, stimulants, cocaine or opiates; (5) report no intravenous drug use for the past 6 months; (6) not be currently suicidal; (7) report no current residential instability; (8) not be experiencing acute psychosis or severe organic impairment; and (9) report no more than 6 hours of participation in other non-self-help treatment during participation in Project MATCH.

Project MATCH identified 57 patients (30 from the outpatient and 27 from the aftercare sample) who displayed significant deterioration during treatment (for more information, see Donovan et al., 2003) and these patients were referred for more intensive treatment in other settings. About 80% of these patients were referred because of continued or excessive drinking. Other reasons for referral included significant suicidal or homicidal ideation or behavior, acute psychosis, severe cognitive or physical impairment, or extensive drug use. These patients continued to be assessed in Project MATCH at subsequent follow-up time points and are included in the sample of patients used here.

Within the present study, patients who provided usable data on measures of alcohol consumption at baseline and 3 months after treatment completion and who could be classified as deteriorated or improved were utilized to determine rates of deterioration and to test the concurrent and predictive validity of deterioration. This represents 912 of the 952 (95.8%) Project MATCH outpatients and 733 of

the 774 (94.7%) Project MATCH aftercare patients. No significant differences were found between patients with and without missing data on any of the baseline factors examined in the present study. All remaining analyses utilized the sample of patients with complete data on the measure of therapeutic alliance. Patient and therapist measures of therapeutic alliance were available for 729 (79.9%) outpatients and 584 (79.7%) aftercare patients. Prior research in Project MATCH indicates that individuals with complete data on measures of therapeutic alliance are representative of the overall Project MATCH sample, with the one exception that they were more likely to be married than were those without complete data (Connors et al., 1997).

Measures

Demographic characteristics. During the baseline interview, patients provided information about demographic characteristics, including gender, age, marital status, ethnicity and years of education.

Drinking behavior. Drinking behavior was measured by interview at all time points using the Form 90 (Miller, 1996). The Form 90 asks patients to provide retrospective data on the quantity and frequency of alcohol consumed per day. These estimates were provided for the 3 months prior to treatment entry and the 3 months prior to the 3-month follow-up. Estimates of percent days abstinent (PDA) and drinks per drinking day (DDD) were obtained from this measure. Additionally, the Form 90 was used to obtain information about any illicit drug use (no/yes). Reliability ratings of good to excellent were reported for both PDA and DDD in this sample (Tonigan et al., 1997).

Ethanol Dependence Syndrome scale (EDS). Severity of alcohol dependence was assessed using the EDS scale (Babor, 1996). This scale consists of 16 items related to the DSM-IV (American Psychiatric Association, 1994) diagnostic criteria for alcohol dependence. This scale demonstrated a high level of reliability in the Project MATCH sample (Babor, 1996).

Drinker Inventory of Consequences (DrInC; Miller et al., 1995). The DrInC is a 45-item self-report scale that measured the frequency of alcohol-related problems during the 3 months prior to the assessment. The DrInC has demonstrated sound interitem agreement and test-retest reliability (Miller et al., 1995).

Addiction Severity Index (ASI; McLellan et al., 1992). On the ASI, patients were asked about the number of psychiatric symptoms they experienced within the past 30 days as an estimate of baseline psychiatric severity. The ASI, and the ASI index of psychiatric severity, are widely used and have demonstrated excellent psychometric properties (McLellan et al., 1992).

Beck Depression Inventory II (BDI-II). The BDI-II (Beck et al., 1996) is a 21-item self-report questionnaire designed to measure the presence and severity of symptoms of depression consistent with the DSM-IV (American Psychiatric Association, 1994). Beck et al. (1996) report high internal consistency and test-retest reliability for this measure.

State-Trait Anger Expression scale (STAX). The STAX is a 44-item self-report instrument with sound internal consistency and validity (Speilberger, 1988). A total score on all items designed to assess the trait of anger on the STAX was used in Project MATCH.

Alcohol Stages of Change Version of the University of Rhode Island Change Assessment (URICA-A). This measure contains four, 7-item subscales that were combined to develop a single scale of motivation to change (DiClemente and Hughes, 1990; Kadden et al., 2003). Reliability estimates for the four subscales ranged from .68 to .85 in the Project MATCH data set (Carbonari and DiClemente, 2000).

Type of treatment and number of sessions. Type of treatment was determined by random assignment and this information was available on all patients. Treatment providers provided information about the number of treatment sessions attended by each patient.

Working Alliance Inventory (WAI). The WAI is a 36-item measure of the patient's capacity to engage in treatment and the patient's experience of the therapeutic relationship as helpful (Horvath and Greenberg, 1986). Both the patient and therapist completed the WAI. This measure yields three subscales (related to the goals of therapy, the task of therapy and the bond between therapist and patient) and a total score. The WAI demonstrated good reliability, with correlations between subscales and the total score ranging from .87 to .96 (Connors et al., 1997). Consistent with past research with the WAI on this sample (Connors et al., 1997), the total scores for patients and therapists reported after the second session of therapy were used here. As noted by Connors et al. (1997), this was done (1) to minimize missing data, (2) to allow the time of assessment to be similar in all treatments, (3) to allow for at least two sessions for therapist and patient to develop a relationship and (4) because past reports have indicated that the WAI yields a general measure of therapeutic alliance on a single dimension (Tracey and Kokotovic, 1989).

Definition of deterioration. Deterioration was defined by calculating a difference score for each individual between PDA for the 3 months prior to baseline and PDA for the 3 months immediately following treatment. This interval of time was chosen because of the following: (1) it kept the window of time assessed at follow-up the same length as that assessed at baseline, (2) it was proximal to treatment, and (3) it allowed patients to experience a "full dose" of treatment prior to the assessment of deterioration. Patients who did not differ in PDA at baseline and 3 months post-treatment (outpatient $n = 15$ or 1.6%; aftercare $n = 5$ or 0.7%) were excluded from further analyses. Thus, the definition of deterioration included only those individuals who

reported a lower PDA in the 3 months following treatment than they did for the 3 months preceding baseline. Subsidiary analyses were conducted on alternative indices of deterioration based on DDD and on a combination of PDA and DDD.

Analysis plan

First, to examine the generalizability of our measure of deterioration, we compared deteriorated and improved patients on three other measures at 3 months posttreatment (DDD, alcohol-related consequences and illicit drug use). We also compared these two patient groups on PDA, DDD, alcohol-related consequences and illicit drug use at 1 year posttreatment. We conducted chi-square tests (for drug use) and one-way analyses of variance (ANOVAs; for PDA, DDD and alcohol-related consequences) to compare the deteriorated and improved groups on these measures. Then, deteriorated and improved patients were compared using chi-square and one-way ANOVAs on the five baseline sociodemographic variables, the seven baseline psychological variables and the four treatment-related variables.

To test a model of predictors of deterioration, all variables that were significant at $p < .05$ or better in the preceding analyses were entered in two separate blocks of a hierarchical logistic regression analysis designed to predict deterioration (no/yes) 3 months after treatment completion. The first block of variables included all significant sociodemographic and baseline psychological variables and the second block included all significant treatment-related variables. Following the development of a model of the direct relationship between patient and treatment related predictors and deterioration, a series of regression analyses were conducted to test whether the treatment factors mediated the effect of the patient factors on deterioration. The analyses of mediation effects followed the procedures outlined in Baron and Kenny (1986).

Results

Prevalence and correlates of deterioration

The overall rate of deterioration in the outpatient sample was 9.8% (n = 91 of 927). In the aftercare sample, the rate of deterioration was slightly lower (6.8%; n = 50 of 738). When compared with patients who improved, the deteriorated patients reported a significantly higher number of DDD and alcohol-related consequences in the 3-month follow-up period (Table 1). In addition, individuals who were classified as deteriorated were significantly more likely to report illicit substance use in the 3-month follow-up period than were individuals who improved. All of these findings held in both the outpatient and aftercare samples. Deteriorated patients continued to show poorer outcomes at the 1-year follow-up. They reported significantly more DDD, more alcohol-related consequences and a lower PDA.

Baseline demographic and psychological factors and deterioration

In general, demographic variables were not related to deterioration with the exception that, in the outpatient sample, deteriorated patients were more likely to be female than were improved patients (Table 2). In the outpatient

TABLE 1. Generalizability of deterioration to other measures of substance use at 3 months and 1 year posttreatment

	Outpatient sample				Aftercare sample			
	Improved (n = 836)	Deteriorated (n = 91)	Statistic	η^2 or ϕ^2	Improved (n = 688)	Deteriorated (n = 50)	Statistic	η^2 or ϕ^2
3 months post-tx								
DDD, mean (SD)	4.8 (5.7)	8.9 (5.2)	$F = 43.1^{\dagger}$, 1/911 df	0.045	4.0 (6.3)	14.8 (10.6)	$F = 120.8^{\dagger}$, 1/732 df	0.142
Consequences, mean (SD)								
DrInC score	27.1 (23.0)	38.1 (20.5)	$F = 13.8^{\dagger}$, 1/564 df[a]	0.024	34.9 (27.4)	54.9 (25.1)	$F = 14.9^{\dagger}$, 1/295 df[a]	0.048
Illicit drugs, % yes	26.6	39.8	$\chi^2 = 6.8$*, 1 df	0.008	13.8	30.0	$\chi^2 = 9.7^{\dagger}$, 1 df	0.013
1 year post-tx								
PDA, mean (SD)	0.75 (0.32)	0.55 (0.39)	$F = 31.0^{\dagger}$, 1/868 df	0.035	0.82 (0.30)	0.54 (0.41)	$F = 36.5^{\dagger}$, 1/704 df	0.049
DDD, mean (SD)	4.8 (5.5)	6.6 (5.3)	$F = 8.9^{\dagger}$, 1/868 df	0.010	4.6 (7.3)	9.7 (10.9)	$F = 21.0^{\dagger}$ 1/704 df	0.029
Consequences, mean (SD)								
DrInC score	27.1 (22.7)	34.8 (22.1)	$F = 6.23$*, 1/530 df[a]	0.012	37.6 (26.6)	52.4 (27.8)	$F = 10.5^{\dagger}$, 1/355 df	0.029
Illicit drugs, % yes	28.0	36.5	χ^2 = NS, 1 df	0.003	17.8	28.6	χ^2 = NS, 1 df	0.005

Notes: Tx = treatment; DDD = drinks per drinking day; DrInC = Drinker Inventory of Consequences; PDA = percent days abstinent; NS = not significant.
[a]Listwise deletion was used for any missing items on the measure of drinking consequences. As a result, scores on this measure were only available on a subsample of Project MATCH participants.
*$p < .05$; $^{\dagger}p < .01$.

TABLE 2. Baseline demographic and psychological characteristics and deterioration

	Outpatient sample				Aftercare sample			
	Improved (n = 667)	Deterior. (n = 62)	Statistic	η^2 or ϕ^2	Improved (n = 552)	Deterior. (n = 32)	Statistic	η^2 or ϕ^2
Demographic								
% Female, n (%)	185 (27.7)	26 (41.9)	χ^2 = 5.6*, 1 df	0.008	109 (19.7)	5 (15.6)	χ^2 = NS, 1 df	0.001
Age, mean (SD) years	39.2 (10.8)	39.4 (12.0)	F = NS, 1/726 df	0.000	42.7 (11.2)	39.6 (11.9)	F = NS, 1/583 df	0.004
Partnered, n (%)	309 (46.5)	22 (35.5)	χ^2 = NS, 1 df	0.004	215 (38.9)	13 (40.6)	χ^2 = NS, 1 df	0.000
White, n (%)	540 (81.2)	52 (83.9)	χ^2 = NS, 1 df	0.000	446 (80.8)	25 (78.1)	χ^2 = NS, 1 df	0.000
Education, mean (SD) years	13.5 (2.1)	13.7 (2.3)	F = NS, 1/726 df	0.000	13.2 (2.0)	12.9 (2.1)	F = NS, 1/583 df	0.001
Psychological								
DDD, mean (SD)	3.5 (.9)	3.4 (0.7)	F = NS, 1/728 df	0.002	4.3 (1.2)	4.6 (1.3)	F = NS, 1/583 df	0.002
Illicit drugs, n (% yes)	290 (43.5)	26 (41.9)	χ^2 = NS, 1 df	0.001	174 (31.5)	10 (31.3)	χ^2 = NS, 1 df	0.001
Alc. dependence mean (SD) EDS scale score	33.3 (9.6)	29.8 (7.2)	F = 7.6†, 1/715 df	0.011	39.8 (11.0)	39.2 (11.0)	F = NS, 1/575 df	0.000
Psych. severity, mean (SD) ASI score	0.2 (0.2)	0.2 (0.2)	F = NS, 1/725 df	0.001	0.2 (0.2)	0.2 (0.2)	F = NS, 1/577 df	0.000
Depression, mean (SD) BDI-II score	9.3 (7.8)	11.8 (8.4)	F = 5.3*, 1/705 df	0.007	10.1 (8.2)	13.1 (8.5)	F = NS, 1/556 df	0.007
Anger scale, mean (SD) STAX scale score	29.1 (7.2)	29.8 (7.7)	F = NS, 1/702 df	0.001	30.5 (7.4)	31.9 (8.3)	F = NS, 1/560 df	0.002
Motivation, mean (SD) URICA score	10.5 (1.7)	10.5 (1.6)	F = NS, 1/723 df	0.000	11.2 (1.5)	11.3 (1.9)	F = NS, 1/579 df	0.000

Notes: Deterior. = deteriorated; NS = not significant; DDD = drinks per drinking day; Alc. = alcohol; EDS = Ethanol Dependence Syndrome; Psych. = psychiatric; ASI = Addiction Severity Index; BDE-II = Beck Depression Inventory II; STAX = State-Trait Anger Expression; URICA = Alcohol Stages of Change Version of the University of Rhode Island Change Assessment.
*$p < .05$; †$p < .01$.

sample, deteriorated patients reported fewer alcohol dependence symptoms and more symptoms of depression than improved patients. These two differences were not identified in the aftercare sample.

Treatment and deterioration

Type of treatment (CBT, MET or TSF) was not related to deterioration in either sample (Table 3). However, deteriorated and improved groups differed on several other treatment-related variables. In the outpatient sample, the deteriorated group attended fewer sessions and scored lower on both the patient and therapist versions of the WAI. In the aftercare sample, deteriorated patients attended fewer treatment sessions than did improved patients.

Predictors of deterioration

We constructed a model in the outpatient sample to examine whether treatment variables were still related to deterioration after patient characteristics were controlled. To avoid utilizing two related measures of the construct of therapeutic alliance, we selected one of the scores for use in the model (r = .25 between patient and therapist WAI scores). Therapist scores were selected because the magnitude of association between therapist scores and deterioration was stronger than the association between patient scores and deterioration.

Within the outpatient sample, lower baseline alcohol dependence and higher depression increased the risk for deterioration (Table 4). After accounting for these differences, both fewer therapy sessions and lower therapist ratings on the WAI were associated with a heightened risk for deterioration. As indicated by Nagelkerke r^2 values, the overall strength of the model was r^2 = .12. A similar model that used patient scores instead of therapist scores on the WAI yielded similar, although somewhat weaker, results.

Following the procedures outlined in Baron and Kenny (1986), regression (either linear or logistic) analyses were conducted to test whether the treatment factors (i.e., number of treatment sessions or therapeutic alliance) mediated the relationship between the significant patient factors (i.e., gender, alcohol dependence and depression) and deterioration. Neither the number of treatment sessions or therapeutic alliance mediated the relationship between the baseline factors and deterioration.

TABLE 3. Characteristics of treatment and deterioration

	Outpatient sample				Aftercare sample			
	Improved (n = 667)	Deterior. (n = 62)	Statistic	η^2 or ϕ^2	Improved (n = 552)	Deterior. (n = 32)	Statistic	η^2 or ϕ^2
Type of tx	–	–	χ^2 = NS, 2 df	0.006	–	–	χ^2 = NS, 2 df	0.001
CBT, n (%)	225 (93.0)	17 (7.0)	–	–	197 (94.3)	12 (5.7)	–	–
MET, n (%)	219 (93.2)	16 (6.8)	–	–	185 (95.4)	9 (4.6)	–	–
TSF, n (%)	223 (88.5)	29 (11.5)	–	–	170 (93.9)	11 (6.1)	–	–
Mean (SD) no. of tx sessions	7.4 (3.7)	6.2 (3.4)	F = 6.1*, 1/727 df	0.008	7.5 (3.9)	6.0 (3.5)	F = 4.1*, 1/583 df	0.007
Patient WAI, mean (SD) score	212.3 (23.7)	204.9 (25.9)	F = 5.5*, 1/727 df	0.007	214.5 (23.5)	216.8 (20.3)	F = NS, 1/583 df	0.001
Therapist WAI, mean (SD) score	193.1 (23.7)	182.8 (26.1)	F = 10.6†, 1/727 df	0.014	195.7 (25.5)	187.4 (27.6)	F = NS, 1/583 df	0.005

Notes: Deterior. = deteriorated; tx = treatment; NS = not significant; CBT = Cognitive-Behavioral Treatment; MET = Motivational Enhancement Therapy; TSF = Twelve-Step Facilitation; WAI = Working Alliance Inventory.
*$p < .05$; †$p < .01$.

Alternative definitions of deterioration

Finally, analyses were conducted to examine alternate definitions of deterioration. One alternative definition was based on an increase in DDD between baseline and follow-up and the other classified individuals as deteriorated if they reported either fewer PDA or more DDD at follow-up as compared with baseline. Using DDD, 9% (n = 89) of the outpatient sample and 4% (n =32) of the aftercare sample were classified as deteriorated. When the definition of deterioration was based on either PDA or DDD, 17% (n = 157) of the outpatient and 10% (n = 75) of the aftercare sample were classified as deteriorated. Logistic regression analyses were conducted to test for the stability of predictors of deterioration, given these alternative definitions of the construct. The results were consistent with those presented in Table 4 and, importantly, both therapeutic alliance and number of treatment sessions remained significant predictors of deterioration. Thus, alternative definitions led to somewhat different rates of deterioration; however, the overall patient and treatment-related predictors of deterioration remained essentially unchanged.

TABLE 4. Model of patient and treatment factors related to deterioration

	Outpatient sample Deteriorated vs nondeteriorated		
	B	Odds ratio	Wald
Patient factors			
Gender (1 = female)	.51	1.7	NS
Ethanol Dependence Syndrome scale	-.06	0.9	11.6†
Depression	.05	1.1	10.1†
Treatment factors			
No. of tx sessions	-.10	0.9	6.6*
Therapist WAI	-.02	0.98	12.6†
Constant	-2.4		
Nagelkerke r^2	.12		

Notes: Tx = treatment; WAI = Working Alliance Inventory.
*$p < .05$; †$p < .01$.

Discussion

When defined by PDA, which was one of the two key outcome criteria used by Project MATCH, rates of deterioration in the 3 months immediately following alcohol treatment were about 10% in the outpatient sample and 7% in the aftercare sample. These rates are slightly lower than the rates of roughly 10% to 15% that have been reported previously (Moos et al., 2001; Moos et al., 2002; Ouimette et al., 1997; Shaw et al., 1997; Shaw et al., 1990). This difference may reflect several factors. First, Project MATCH utilized empirically validated treatments provided by well-trained clinicians (Babor and Del Boca, 2003). This may have lessened the likelihood of deterioration in conjunction with treatment. In addition, we measured deterioration in close proximity to treatment completion and thus would not have identified patients who exhibited an initial positive response to treatment only to deteriorate at a later time. Finally, Project MATCH referred some patients who deteriorated during treatment to more intensive treatment in different settings, which may have improved their outcomes. Thus, the present study likely underestimates the overall rate of deterioration following treatment for alcohol-use disorders.

In general, the results from the outpatient sample of Project MATCH are consistent with the model that both patient and treatment factors are uniquely related to deterioration (Moos, 2005). However, few baseline factors predicted deterioration in the outpatient sample and none

predicted deterioration in the aftercare sample. The finding that higher baseline depression predicted deterioration in the outpatient sample is consistent with past reports that deterioration is related to general increases in psychopathology (Moos et al., 2002). Similarly, Karno and Longabaugh (2003) reported that patients with elevated depressive symptoms were more likely to display negative alcohol-related outcomes if alcohol-use disorder treatment focused on painful emotional content.

Patients in the outpatient sample who had lower baseline alcohol dependence scores were more likely to deteriorate. This may reflect the fact that these patients experienced fewer alcohol-related symptoms at the start of treatment and, consequently, failed to fully invest in treatment. However, supplementary analyses indicated that aspects of treatment did not mediate the relationship between either lower alcohol dependence or depression and deterioration. Thus, the impact of lower alcohol dependence may be more direct, indicating that these patients may not have "hit bottom" or the timing of treatment was such that the natural course of their alcohol dependence placed them at greater risk for worse outcomes independent of their treatment experience. Studies that include a no-treatment control group could help disentangle the course of alcohol dependence from the effect of treatment in determining deterioration.

Our findings showed comparable rates of deterioration in the three Project MATCH treatments (CBT, MET and TSF) in both outpatient and aftercare samples. This finding is consistent with the general results of Project MATCH, which identified no main effects of treatment type (Project MATCH Research Group, 1997). Thus, each of the three psychosocial treatments for alcohol-use disorders was associated with a small but important risk of deterioration. Comparable deterioration rates were also identified in a separate study of cognitive-behavioral, 12-step facilitation and eclectic treatment (Ouimette et al., 1997). Taken together, these findings suggest that common characteristics of treatment may be more closely associated with deterioration than is the theoretical orientation of treatment. Consequently, treatment providers of each orientation should be aware of this risk and be alert to early signs of deterioration.

As shown in a previous study (Moos et al., 2001), patients who attended fewer treatment sessions were more likely to deteriorate. In this respect, a longer duration of care has been associated with a reduced likelihood of the exacerbation of substance-use symptoms; moreover, a longer duration of care may have a somewhat stronger protective influence against symptom intensification for high-risk than for low-risk patients (Moos et al., 2002). These findings are consistent with several studies that have found a longer duration of care, especially outpatient mental health care, to be associated with better treatment outcome (Moos et al., 2000, 2001; Ouimette et al., 1998).

The quality of the treatment experience (i.e., a poorer therapeutic alliance) was independently associated with deterioration within the outpatient sample. Given the considerable attention paid to adherence to the specified *content* of treatments within Project MATCH (Project MATCH Research Group, 1997), it is important to note that the quality of the relationship between therapist and patient remains a salient predictor of both positive (Connors et al., 1997) and negative response to treatment. A positive alliance is consistently associated with better outcomes among patients in treatment for substance-use disorders (Lebow et al., in press). The finding that lack of a positive alliance may be related to deterioration is an important extension of this literature; it suggests that a weak alliance may be an early warning signal of future problems in treatment and/or an exacerbation of substance-use symptoms. These findings indicate that treatment providers should be especially attuned to patient characteristics associated with treatment dropout and missed appointments, as well as to their own perception and the patient's perception of the quality of the therapeutic alliance.

Only one factor (number of treatment sessions) was related to deterioration in the aftercare sample and, consequently, a model of patient and treatment factors was only examined in the outpatient sample. Within the outpatient sample, the model was predictive but only accounted for 12% of the variance. This is similar to other findings from Project MATCH; for example, Connors et al. (1997) reported that ratings of therapeutic alliance predicted 12-month outcomes more strongly in the outpatient than in the aftercare patients and predictions accounted for only a small part of the variance. The aftercare group completed a form of intensive alcohol treatment prior to treatment in Project MATCH, which may have decreased the relative influence of treatment and patient factors within this sample.

Importantly, short-term deterioration appears to be a harbinger of poor outcomes in the longer term. Patients who deteriorated on the primary outcome measure also displayed worse outcomes on three related indices at 3 months and continued to show worse alcohol-related outcomes 1 year posttreatment. Evidence from prior studies indicates that deterioration may be associated with prolonged negative effects and considerable burden on the health care system. Specifically, deteriorated patients are more likely to be rehospitalized and to receive more additional hospital care than do patients who remain stable or improve with treatment (Moos et al., 2001, 2002). These findings suggest that proximal measures of deterioration can serve as early warning indicators to trigger more intense preventive intervention.

Although these findings have important clinical implications, several limitations of the present study should be noted. First, the clear benefit of treatment for most patients treated in Project MATCH means that research on

deterioration in this sample was focused on a small number of individuals, which may have detracted from the strength and stability of the findings. More sensitive measures of deterioration are needed in order to advance research on this topic. In the present study, deterioration was primarily defined using a single index of alcohol use. Although, as expected, alternative definitions resulted in somewhat different estimates of the prevalence of deterioration, the patient- and treatment-related predictors of deterioration remained essentially the same. These findings strengthen the likelihood that treatment-related factors may be important predictors of deterioration. As noted earlier, the close monitoring of patients and treatment providers in Project MATCH may have lessened the likelihood of deterioration, and the criteria for sample selection, which limited the variability in patient characteristics such as psychopathology and drug use, may have reduced the likelihood of identifying predictors of deterioration. Taken together, these limitations indicate that the present study likely presents conservative estimates of the rates of deterioration and may underestimate the number and strength of predictors of deterioration.

Overall, despite the average positive response of patients to treatment in Project MATCH and, more generally, to treatment for substance-use disorders, an important minority of patients appears to deteriorate during or shortly after treatment. This phenomenon has been relatively neglected in the substance-use treatment outcome literature. Given the fact that treatment is only one of many influences on a patient's life, it is difficult to know whether an exacerbation of substance use and related symptoms, or general deterioration in a patient's condition, is a direct consequence of treatment. Irrespective of the causes of deterioration, however, clinicians should be more vigilant about identifying and preventing deterioration, and evaluation researchers need to develop monitoring procedures to routinely obtain information about adverse events and declines in patients' conditions during treatment. If the relevant factors are identified early and addressed in treatment, it is likely that deterioration can often be predicted and avoided.

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